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NAVFAC **IGS-15081 (February 2003)**

Preparing Activity: LANTNAVFACENGCOM **Based on UFGS-15081**

ITALIAN GUIDE SPECIFICATIONS

Use for ITALIAN projects only

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SECTION 15081

EXTERIOR PIPING INSULATION
02/03

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NOTE: This guide specification is issued by the Atlantic Division, Naval Facilities Engineering Command for regional use in Italy.

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NOTE: This guide specification covers field-applied insulation requirements for exterior steam piping, exterior condensate piping including aboveground piping, piping on piers, piping under piers, piping in trenches on piers, piping in tunnels, and piping in manholes. The insulation thickness in this guide specification is suitable for most geographical regions. However, if the project is located in a region where extreme annual temperatures occur, the design engineer should evaluate the insulation thickness requirements for the particular region and change the insulation thickness based on an economical analysis, with the approval of the Engineering Field Division, Naval Facilities Engineering Command, Mechanical Engineering Branch.

Comments and suggestion on this specification are welcome and should be directed to the technical proponent of the specification. A listing of the technical proponents, including their organization designation and telephone number, is on the Internet.

Use of electronic communication is encouraged.

Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.

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PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E 84	(1997; Rev. A) Surface Burning Characteristics of Building Materials

ITALIAN LAWS AND NORMS (D.M.)(LAW)(CIRC.)

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NOTE: Italian laws and normatives are the legislative regulations and decrees issued by the Italian government in the form of laws, norms, decrees, circulars, and letters. These Laws and Decrees concur together with Norms and Standards in forming the governing directives for construction.

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Law 10	(9 January 1991) Norms for the Implementation of the National Energy Plan Concerning the National Energy Saving and Development of Renewable Sources of Energy
D.P.R. 412	(26 August 1993) Regulation regarding Norms for the Design, Installation, Use and Maintenance of Thermal Plants in Building for the Containment of Energy Consumption in accordance with Law 10

ITALIAN NATIONAL ASSOCIATION FOR UNIFICATION OF STANDARDS (UNI)

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NOTE: A UNI Norm is a technical normative recognized as Italian Law, submitted by a private organization "Ente Nazionale Italiano di Unificazione" for Italy and is available only in the Italian language. It is the National Standard.

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UNI 5958	(1985) Mineral fibre products for thermal and acoustical insulation - Terms and definitions
UNI 6265	(1968) Glass fibre products for thermal and acoustical insulation - Pipe coverings - Dimensional and shape tolerances and respective determinations
UNI 6547	(1985) Mineral fibre boards for thermal

	and acoustical insulation - Determination of the flexibility index
UNI 7819	(1988) Cellular plastics, rigid - Expanded polystyrene sheets for thermal insulation - Types, requirements and tests
UNI 8202-1	(1981) Building - Water proof sheets - Generalities for test methods
UNI 8202-3	(1988) Building - Water proof sheets - Determination of length
UNI 8202-4	(1988) Building - Water proof sheets - Determination of width
UNI 8202-7	(1981) Building - Water proof sheets - Determination of areic mass
UNI 8811	(1987) Mineral fibres - Resin bounded blankets for thermal insulation - Acceptance criteria
UNI 10376	(1994) Thermal insulation for heating and cooling systems for buildings
UNI 10522	(1996) Mineralwool products for thermal and acoustical insulation - Fibres, felts, resin bonded slabs and pipe coverings - Determination of volatile matters content

ITALIAN/EUROPEAN HARMONIZATION STANDARDS (UNI EN)(UNI ENV)(CEI EN) (UNI EN ISO)(UNI ISO)

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NOTE: A UNI EN, UNI ENV, CEI EN, UNI EN ISO or UNI ISO is a European Standard with a coincident Italian National Standard or International Standard. The two standards are identical, with most (but not all) EN's available in the English language and the UNI available only in the Italian language.

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UNI EN 485-2	(1996) Aluminium and aluminium alloys - Sheet, strip and plate - Part 2: Mechanical properties
UNI EN 485-3	(1996) Aluminium and aluminium alloys - Sheet, strip and plate - Part 3: Tolerances on shape and dimensions for hot-rolled products
UNI EN 485-4	(1996) Aluminium and aluminium alloys -

	Sheet, strip and plate - Part 4: Tolerances on shape and dimensions for cold-rolled products
UNI EN 10088-2	(1997) Stainless steels - Part 2: Technical delivery conditions for sheet/plate and strip for general purposes
UNI EN 10259	(1998) Cold-rolled stainless steel wide strip and plate/sheet - Tolerances on dimensions and shape

1.2 SYSTEM DESCRIPTION

Provide [new and modify existing] field-applied insulation for exterior steam piping[, existing insulated piping affected by Contractor's operation,] and exterior condensate piping. Provide new asbestos-free insulation materials.

1.2.1 Packaging and Labeling

Each package or standard container of insulation, jackets, cements, adhesives, and coatings delivered to the Project site shall have the Manufacturer's stamp or label attached giving the name of the Manufacturer, brand, and description of material. Insulation packages and containers shall be asbestos-free.

1.2.2 Surface Burning Characteristics

All materials specified herein shall have a maximum flame spread of 25 and maximum smoke developed rating of 50 when tested in accordance with ASTM E 84.

1.3 SUBMITTALS

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NOTE: Where a "G" in submittal tags follows a submittal item, it indicates Government approval for that item. Add "G" in submittal tags following any added or existing submittal items deemed sufficiently critical, complex, or aesthetically significantly to merit approval by the Government. Submittal items not designated with a "G" will be approved by the QC organization.

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Submit the following in accordance with Section 01330, "Submittal Procedures."

SD-03 Product Data

Insulation

Jacket

SD-08 Manufacturer's Instructions

Installation manual for field-applied insulation

1.4 RECYCLED MATERIALS

Provide thermal insulation containing recycled materials to the extent practicable, provided that the material meets all other requirements of this section. The minimum recycled material content of the following insulation are:

Rock Wool - 75 percent slag by weight
Fiberglass - 20-25 percent glass cullet by weight
Phenolic Rigid Foam - 5 percent recovered material
Plastic Rigid Foam - 9 percent recovered material
Polyurethane - 9 percent recovered material
Rigid Foam - 9 percent recovered material

1.5 IDENTIFICATION OF NEW ASBESTOS-FREE INSULATION

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NOTE: Do not use for new buildings or existing buildings with no asbestos insulation.
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Identify new asbestos-free insulation with "ASBESTOS-FREE" markings spaced at maximum of 6.0 mm intervals on the insulation jacket. Indicate the limits of new asbestos-free insulation with 51 mm wide orange bands with attached arrows pointing in the direction of the "ASBESTOS-FREE" markings.

PART 2 PRODUCTS

2.1 SOURCE MANUFACTURERS

2.1.1 Fibrous Glass Pipe Insulation

The following manufacturers provide fibrous glass type insulation for piping that generally complies with these specifications:

SAINT-GOBAIN ISOVER ITALIA S.p.A.
Via Romagnoli, 6
20146 Milano
Tel: 02-42431
Fax: 02-4895-3780
www.isover.it

FORTLAN S.p.A.
Via Papa Giovanni XXXII n. 16
42020 San Polo d'Enza Reggio Emilia
Tel: 0522-873621
Fax: 0522-874352
www.fortlanspa.com

TECHNIK
Via dei Lavoratori, 78
20092 Cinisello Balsamo - Milano
Tel: 02-660761
Fax: 02-66076285
www.technik.it

CLIMAPRODUCT
Via delle Gerole, 15
20040 Caponago - Milano
Tel: 02-950071
Fax: 02-95007238
www.climaproduct.com

2.1.2 Mineral Fiber Pipe Insulation

The following manufacturers provide mineral fiber type insulation for piping that generally complies with these specifications:

SAINT-GOBAIN ISOVER ITALIA S.p.A.
Via Romagnoli, 6
20146 Milano
Tel: 02-42431
Fax: 02-4895-3780
www.isover.it

ISOLMEC s.r.l.
via IV Novembre
22070 Grandate (Como)
Tel: 031-564656
Fax: 031-564666
www.isolmec.com

ROCKWOOL Italia S.p.A.
Via Mascheroni, 31
20145 Milano
Tel: 02-4996181
Fax: 02-4991821
www.rockwool.it

2.1.3 Calcium Silicate Pipe Insulation

The following manufacturers provide calcium silicate type insulation for piping that generally complies with these specifications:

SAICOP s.r.l.
via Maestri del Lavoro, 22
12020 Madonna dell'Olmo (CN)
Tel: 0171-411300
Fax: 0171-411837
www.saicop.com

PROMAT S.p.A.
Corso Paganini, 39/3

16125 Genova
Tel: 010-2488411
Fax: 010-213768
www.promat.it

2.1.4 Cellular Glass Pipe Insulation

The following manufacturers provide cellular glass type insulation for piping that generally complies with these specifications:

FORTLAN S.p.A.
via Papa Giovanni XXXIII, 16
42020 San Polo d'Enza (RE)
Tel: 0522-873-621
Fax: 0522-874-352
www.fortlanspa.com

HABITEMA S.p.A.
Viale Virgilio, 58/N
41100 Modena
Tel: 059-848797
Fax: 059-848847
www.habitema.it

2.1.5 Polyurethane Pipe Insulation

The following manufacturers provide polyurethane type insulation for piping that generally complies with these specifications:

ISO FOM s.r.l.
via dell'Industria, 1
61020 Montecchio di S. Angelo in Zizzola (PU)
Tel: 0721-490450
Fax: 0721-490040
www.isoform.it

ARMACELL Italia S.p.A.
Via Venezia, 4
20060 Trezzano Rosa (MI)
Tel: 02-90967300
Fax: 02-90969375
www.armacell.com

TECHNIK
Via dei Lavoratori, 78
20092 Cinisello Balsamo - Milano
Tel: 02-660761
Fax: 02-66076285
www.technik.it

CLIMAPRODUCT
Via delle Gerole, 15
20040 Caponago - Milano
Tel: 02-950071

Fax: 02-95007238
www.climaproduct.com

BRUGG PIPESYSTEM S.r.l
Via Luigi Bertolini, 27
29100 Piacenza
Tel: 0523-590431
Fax: 0523-594369
www.pipesystem.com

2.1.6 Mineral Fiber Pipe Wrap Insulation

The following manufacturers provide mineral fiber pipe wrap type insulation for piping that generally complies with these specifications:

SAINT-GOBAIN ISOVER ITALIA S.p.A.
Via Romagnoli, 6
20146 Milano
Tel: 02-42431
Fax: 02-4895-3780
www.isover.it

ISOLMEC s.r.l.
via IV Novembre
22070 Grandate (Como)
Tel: 031-564656
Fax: 031-564666
www.isolmec.com

2.1.7 Aluminum Jacket

The following manufacturers provide aluminum insulation jackets that generally comply with these specifications:

ARMACELL Italia S.p.A.
Via Venezia, 4
20060 Trezzano Rosa (MI)
Tel: 02-90967300
Fax: 02-90969375
www.armacell.com

ROVETTA ACCIAI
Via G. Ferrarsi, 11/13
80020 Casavatore (NA)
Tel: 081-7365972
Fax: 081-7383590
www.rovettacciai.it

2.1.8 Asphalt-Saturated Felt

The following manufacturers provide asphalt-saturated felt materials that generally comply with these specifications:

SAINT-GOBAIN ISOVER ITALIA S.p.A.

Via Romagnoli, 6
20146 Milano
Tel: 02-42431
Fax: 02-4895-3780
www.isover.it

FOPAN S.p.a.
Via Vittono Veneto, 19
31040 Chiarano (TV)
Tel: 0422-2030
Fax: 0422-203040
www.fopan.it

2.1.9 Stainless Steel Jacket

The following manufacturers provide stainless steel insulation jackets that generally comply with these specifications:

ACCIAI DI QUALITA
Via XX Settembre, 31/7
16121 Genova
Tel: 010-53971
Fax: 010-5397236
www.adq.it

GRUPPO HODARA S.p.A.
viale Lombardia, 16
20090 Buccinasco (MI)
Tel: 02-457721
Fax: 02-48842783
www.hodara.it

SARGOM s.r.l.
via Volturno, 27
25126 Brescia (BS)
Tel: 030-320969
Fax: 030-320882
www.sargom.it

2.2 PIPING INSULATION

UNI 6265, UNI 6547, UNI 7819, UNI 8811, Law 10, and D.P.R. 412. Pipe insulation shall conform with the referenced publications and the specified temperature ranges and densities in kilograms per cubic meter (Kg/m3). Insulation for fittings, flanges, and valves shall be premolded, precut, or job-fabricated insulation of the same thickness and conductivity as used on adjacent piping. Unless otherwise specified, insulate all fittings, flanges and valves, except valve stems, hand wheels, and operators. Provide insulation with insulation manufacturer's standard reinforced fire retardant jackets, with or without integral vapor barrier as required by the service. Insulation jackets shall be factory cleanable, grease resistant, non-flaking and non-peeling suitable for field painting.

2.2.1 Fibrous Glass Pipe Insulation

Insulation shall have minimum density of 48 kilograms per cubic meter and shall be provided with a factory applied piping insulation jacket. Insulation shall comply with the following requirements:

Property	Value
Thermal conductivity coefficient at +/- 0 degrees C	0.032 W/m degrees C
Temperature Range	7 degrees C to 135 degrees C
Moisture Absorption	Less than 0.2 percent by volume
Alkalinity	Less than 0.6 percent expressed as Na20
Corrosivity (with steel, copper, aluminum)	Do not accelerate
Shrinkage	None

2.2.2 Mineral Fiber Pipe Insulation

UNI 5958, UNI 10376, and UNI 10522, minimum density of 96 kg/cu. m. Thermal conductivity shall be not greater than 0.32 W/(m x k) at 24 deg. C.

2.2.3 Calcium Silicate Pipe Insulation

UNI 10376. Inorganic hydrous calcium silicate, non-asbestos fibrous reinforcement; incombustible. Thermal conductivity of 0.086 W/(m x k) at 260 deg. C., dry density of 240 kg/cu. m, and compressive strength of 413.4 kPa minimum at 5 percent deformation. Flame spread of 0 and smoke developed of 0 when tested in accordance with ASTM E 84. Provide in preformed pipe sections as appropriate for surface.

2.2.4 Cellular Glass Pipe Insulation

UNI 10376.

2.2.5 Polyurethane Pipe Insulation

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NOTE: Polyisocyanurate is not commonly used in Italy.
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UNI 10376, minimum density of 27.20 kilograms per cubic meter (kg/cu m).

2.2.6 Mineral Fiber Pipe Wrap Insulation

UNI 10376 for material, minimum density of 36.80 kg/cu m.

2.3 MINIMUM THICKNESS OF INSULATION FOR STEAM PIPING

2.3.1 Fibrous Glass Pipe Insulation

Nominal Pipe Sizes (mm)	Aboveground Piping Insulation Thickness (mm)	Piping in Trenches on Piers Insulation Thickness (mm)
less than 80	90.00	65.00
80 thru 100	100.00	75.00
125 thru 150	115.00	90.00
200 and larger	125.00	100.00

2.3.2 Mineral Fiber Pipe Insulation

Mineral fiber pipe insulation having an insulating efficiency not less than that of the specified thickness of fibrous glass pipe insulation may be provided in lieu of fibrous glass pipe insulation.

2.3.3 Calcium Silicate Pipe Insulation

Nominal Pipe Sizes (mm)	Piping in Tunnels Piping in Manholes Insulation Thickness (mm)	Piping Under Piers (Not in Trenches) Insulation Thickness (mm)
less than 80	100.00	125.00
80 thru 100	115.00	150.00
125 thru 150	125.00	175.00
200 and larger	150.00	200.00

2.3.4 Cellular Glass Pipe Insulation

Cellular glass pipe insulation having an insulating efficiency not less than that of the specified thickness of calcium silicate pipe insulation may be provided in lieu of calcium silicate pipe insulation.

2.3.5 Mineral Fiber Pipe Wrap Insulation

Mineral fiber pipe wrap insulation having an insulating efficiency not less than that of the specified thickness of fibrous glass pipe insulation may be provided in lieu of fibrous glass pipe insulation for pipe sizes 250 mm and larger.

2.4 MINIMUM THICKNESS OF INSULATION FOR PUMPED CONDENSATE RETURN PIPING

Minimum thickness of insulation for pumped condensate return piping shall be as follows.

2.4.1 Mineral Fiber Pipe Insulation

Nominal Pipe Sizes (mm)	Piping in Tunnels Piping in Manholes Insulation Thickness (mm)	Aboveground Piping Insulation Thickness (mm)
less than 80	40.00	65.00
80 thru 100	50.00	75.00
125 and larger	65.00	90.00

2.4.2 Fiber Glass Pipe Insulation

Fiber glass pipe insulation having an insulating efficiency not less than that of the specified thickness of mineral fiber pipe insulation may be provided in lieu of mineral fiber pipe insulation for aboveground piping.

2.5 MINIMUM THICKNESS OF INSULATION FOR GRAVITY CONDENSATE (STEAM) PIPING

Provide 25 mm thick fibrous glass pipe insulation for aboveground piping. Provide 25 mm thick mineral fiber, calcium silicate, or cellular glass pipe insulation for piping in manholes and tunnels.

2.6 ALUMINUM JACKET

UNI EN 485-2, UNI EN 485-3, UNI EN 485-4, minimum thickness of 0.40 mm, with factory-applied or on-site applied polyethylene and kraft paper moisture barrier on inside surface. Provide smooth surface jackets for jacket outside diameters less than 200 mm. Provide corrugated surface jackets for jacket outside diameters 200 mm and larger. Provide stainless steel bands, minimum width of 13 mm. Provide factory prefabricated aluminum covers for insulation on fittings, valves, and flanges.

2.7 ASPHALT-SATURATED FELT

UNI 8202-1, UNI 8202-3, UNI 8202-4, and UNI 8202-7, without perforations, minimum weight of 0.49 kilograms per square meter.

2.8 STAINLESS STEEL JACKET

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NOTE: Stainless steel covers not easily available; most of installers make them in place as a standard practice.

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UNI EN 10259 and UNI EN 10088-2, minimum thickness of 0.25 mm, smooth surface with factory-applied polyethylene and kraft paper moisture barrier on inside surface. Provide stainless steel bands, minimum width of 13 mm. Provide factory prefabricated or equivalent custom made stainless steel covers for insulation on fittings, valves, and flanges.

PART 3 EXECUTION

3.1 INSTALLATION

Obtain Contracting Officer's written approval of piping systems prior to the application of insulation. Insulation shall be clean, dry, and installed prior to the application of insulation jacket. Do not use short pieces of insulation and jacket materials where a full length section will fit. Provide insulation materials and jackets with smooth and even surfaces, with jackets drawn tight, and secured on longitudinal and end laps. Insulate fittings and piping accessories with premolded, precut, or field-fabricated pipe insulation of the same pipe insulation material and thickness as the adjoining pipe insulation. Provide unions, flanges, valves, and piping accessories with removable (snap-on) sections of insulation. Provide insulation continuous through pipe hangers and pipe supports. Do not step on or walk on insulation or jacket. Cover ends of exposed insulation with waterproof mastic.

3.2 PIPING INSULATION

Provide factory preformed pipe insulation. For insulation protection shields; provide rigid pipe insulation of the same thickness as adjacent pipe insulation and having a minimum compressive strength of 240 kPa or provide hardwood plugs having a minimum of 650 kPa bearing surface with the wood grain perpendicular to the pipe, between the insulation protection shields and the pipe; except insulation having a minimum density of 112 kg/m3 may be provided between the insulation protection shields and the pipe for piping 50 mm and smaller. Install insulation with joints tightly butted. Overlap longitudinal jacket laps not less than 38 mm. Wrap butt joints with butt strips not less than 75 mm wide of identical materials as jacket. Cement jacket laps and butt strips on both surfaces with fire-resistant, waterproof bonding adhesive or with factory-applied self-sealing system. Staples shall be stainless steel, outside clinched without complete penetration of insulation. If vapor barrier jacket is pierced or punctured, brush coat with vapor barrier coating to provide a vapor-tight covering. If molded or mitered fitting covers are used, join with fire-resistant, waterproof bonding adhesive or wire in place and provide with a smooth coat of finishing cement.

3.2.1 Fibrous Glass Pipe Insulation

Install in accordance with the manufacturer's recommendations.

3.2.2 Mineral Fiber Pipe Insulation

Install in accordance with the manufacturer's recommendations.

3.2.3 Calcium Silicate Pipe Insulation

Install in accordance with the manufacturer's recommendations, except as modified herein. Secure with not less than 9.50 mm width fibrous glass reinforced waterproof tape or stainless steel bands spaced not more than 200 mm on centers. Provide one layer of asphalt-saturated felt over the insulation prior to installing aluminum jacket. Factory-applied polyethylene and kraft paper moisture barrier will not be permitted as a substitute for the asphalt-saturated felt.

3.2.4 Cellular Glass Pipe Insulation

Install as specified for calcium silicate pipe insulation.

3.2.5 Polyurethane and Pipe Insulation

Install only on aboveground pumped condensate (hot water) return piping in accordance with the manufacturer's recommendations.

3.2.6 Mineral Fiber Pipe Wrap Insulation

Install in accordance with the manufacturer's recommendations.

3.3 INSULATION JACKET

Provide new piping insulation and existing piping insulation affected by Contractor's operations with aluminum jacket. Machine cut the jacket to produce a straight, smooth edge. Lap longitudinal and circumferential seams not less than 50 mm. Install jackets on horizontal piping with the longitudinal seam approximately midway between horizontal centerline and the bottom side of pipe. Install with the top edge of jacket overlapping the bottom edge of jacket and with the seam of each jacket offset from the seam of the adjacent jacket. Install jackets on vertical piping and on piping pitched from the horizontal from low point to high point so that the lower circumferential edge of each jacket overlaps the jacket below it. Provide factory prefabricated covers to the maximum extent as possible for insulation on fittings, valves, and flanges. Finish jackets neatly at pipe hangers and pipe supports. Terminate jackets neatly at the ends of unions, valves, traps, and strainers. Secure jacket with stainless steel bands spaced not more than 200 mm on center.

3.3.1 Additional Requirements for Insulated Piping Under Piers

Provide one layer of asphalt-saturated felt over the insulation prior to installing stainless steel jacket.

3.3.2 Under Pier Stainless Steel Jacket

In addition to the above requirements for aluminum jackets, secure longitudinal and circumferential seams with stainless steel screws spaced not more than 100 mm on centers. At approximately every 6 linear meter of piping, lap the circumferential seams not less than 150 mm; omit the screws.

3.4 ASPHALT-SATURATED FELT

Apply felt with longitudinal and circumferential seams lapped not less than 150 mm. Secure with not less than 13 mm width stainless steel bands spaced not more than 200 mm on center.

-- End of Section --